**QUESTÂO 5:**

Dada a função = . Desta forma, e os intervalos (-).

Resolução:

#include <stdio.h>

#include <stdlib.h>

#include <math.h>

#include <conio.h>

void gradMin(float\* x, float\* v){

float gx, hx, fx;

gx = -(pow(x[0]-8,2)+pow(x[1]-8,2))/8;

hx = -(pow(x[0]-12,2)+pow(x[1]-12,2))/8;

v[0] = ((-(x[0]-8)/4)\*exp(gx) + (-(x[0]-12)/4)\*exp(hx))\*(-1);

v[1] = ((-(x[1]-8)/4)\*exp(gx) + (-(x[0]-12)/4)\*exp(hx))\*(-1);

}

void gradMax(float\* x, float\* v){

float gx, hx, fx;

gx = -(pow(x[0]-8,2)+pow(x[1]-8,2))/8;

hx = -(pow(x[0]-12,2)+pow(x[1]-12,2))/8;

v[0] = (-(x[0]-8)/4)\*exp(gx) + (-(x[0]-12)/4)\*exp(hx);

v[1] = (-(x[1]-8)/4)\*exp(gx) + (-(x[0]-12)/4)\*exp(hx);

}

void CalculoX(float alpha, float\* x, float\* v){

x[0]=x[0]-alpha\*v[0];

x[1]=x[1]-alpha\*v[1];

}

float CalculoAlpha(float\* x){

float alpha, alpha2;

if((((-(pow(-2\*x[0]\*x[1] + pow(x[1],3) + pow(x[0],2)\*(1 + x[1]),2)))\*

(pow(x[0],4) + 4\*x[0]\*x[1] + pow(x[1],2)\*(-4 + pow(x[1],2)) +

pow(x[0],2)\*(-1 + 2\*pow(x[1],2)))))<0){

alpha2 =0.1;

}else if((pow(x[0],6) - 12\*pow(x[0],3)\*x[1] - 12\*x[0]\*pow(x[1],3) +

3\*pow(x[0],4)\*(1 + pow(x[1],2)) + 3\*pow(x[0],2)\*

pow(x[1],2)\*(5 + pow(x[1],2)) + pow(x[1],4)\*

(12 + pow(x[1],2)))==0){

alpha2 =0.1;

}else{

alpha2 = (pow(x[0],3) + pow(x[0],5) - 4\*pow(x[0],2)\*x[1] -

2\*pow(x[0],3)\*x[1] + 4\*x[0]\*pow(x[1],2) + 4\*pow(x[0],2)\*

pow(x[1],2) + 2\*pow(x[0],3)\*pow(x[1],2) -

2\*x[0]\*pow(x[1],3) + 4\*pow(x[1],4) + x[0]\*pow(x[1],4) +

sqrt((-(pow(-2\*x[0]\*x[1] + pow(x[1],3) + pow(x[0],2)\*

(1 + x[1]),2)))\*(pow(x[0],4) + 4\*x[0]\*x[1] +

pow(x[1],2)\*(-4 + pow(x[1],2)) + pow(x[0],2) \*

(-1 + 2\*pow(x[1],2)))))/(pow(x[0],6) - 12\*pow(x[0],3)\*x[1] -

12\*x[0]\*pow(x[1],3) + 3\*pow(x[0],4)\*(1 + pow(x[1],2)) +

3\*pow(x[0],2)\*pow(x[1],2)\*(5 + pow(x[1],2)) +

pow(x[1],4)\*(12 + pow(x[1],2)));

}

return alpha2;

}

float fObjMax(float\* x){

return (exp(-(pow(x[0]-8,2)+pow(x[1]-8,2))/8) - exp(-(pow(x[0]-12,2)+pow(x[1]-12,2))/8));

}

float fObjMin(float\* x){

return (exp(-(pow(x[0]-8,2)+pow(x[1]-8,2))/8) - exp(-(pow(x[0]-12,2)+pow(x[1]-12,2))/8))\*(-1);

}

int main (){

float x[2];

float v[2];

float alpha, obj=0;

int k=0;

printf("\ndigite os valores iniciais de x: ");

scanf("%f",&x[0]);

system("cls");

printf("\ndigite os valores iniciais de y: ");

scanf("%f",&x[1]);

system("cls");

printf("---------------------------------------------------------------------------\n");

printf("| IT.| F(x1,x2) | GRADIENTE | ALPHA | x | y |\n");

printf("---------------------------------------------------------------------------\n");

for(k=1;k<=10;k++){

printf("|%2d. | %10.6f | v1= %10.6f | %10.6f | %10.6f | %9.6f |\n",k,obj,v[0],alpha,x[0],x[1]);

printf("| | | v2= %10.6f | | | |\n",v[1]);

obj = fObjMax(x);

gradMax(x,v);

alpha = CalculoAlpha(x);

CalculoX(alpha, x, v);

}

printf("---------------------------------------------------------------------------\n\n\n");

printf("---------------------------------------------------------------------------\n");

printf("| IT.| F(x1,x2) | GRADIENTE | ALPHA | x | y |\n");

printf("---------------------------------------------------------------------------\n");

for(k=1;k<=10;k++){

printf("|%2d. | %10.6f | v1= %10.6f | %10.6f | %10.6f | %9.6f |\n",k,obj,v[0],alpha,x[0],x[1]);

printf("| | | v2= %10.6f | | | |\n",v[1]);

obj = fObjMin(x);

gradMin(x,v);

alpha = CalculoAlpha(x);

CalculoX(alpha, x, v);

}

printf("---------------------------------------------------------------------------\n");

system("pause");

return(0);

}

Obtemos os valores para x1 = 2 e x2 = 1:

